Catches and Trawl Locations of *R/V G.B. REED* and *M/V EASTWARD HO* during the Pacific Ocean Perch Assessment Cruise to Queen Charlotte Sound, August-September, 1984

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CATCHES AND TRAWL LOCATIONS OF R/V G.B. REED AND M/V EASTWARD HO DURING THE PACIFIC OCEAN PERCH ASSESSMENT CRUISE TO QUEEN CHARLOTTE SOUND, AUGUST-SEPTEMBER, 1984

by

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ABSTRACT

Nagtegaal, D. A., B. M. Leaman, and R. D. Stanley. 1986. Catches and trawl locations of R/V G.B. REED and M/V EASTWARD HO during Pacific ocean perch assessment cruise to Queen Charlotte Sound, August-September, 1984. Can. Data Rep. Fish. Aquat. Sci. 611: 109 p.

The R/V G.B. REED and the Canadian commercial trawler M/V EASTWARD HO surveyed Queen Charlotte Sound (Goose Is. Gully and Mitchell's Gully) to assess the biomass of Pacific ocean perch. A stratified-systematic survey design was used, occupying stations in each 36.5 m (20 fath) depth interval along selected Loran C lines, between depths of 146 to 291 m (80-159 fath). Biomass estimates, based on the door spread as the effective path width of the trawl, for Mitchell's Gully were 2512 ± 84% t (GBR) and 2401 ± 119% t (EHO) and for Goose Is. Gully were 6763 ± 64% t (GBR) and 16,201 ± 54% 5 (EHO). The second purpose of this survey was to compare catch rates between the G.B. REED and the EASTWARD HO. Results of this preliminary comparison indicate that the catch ratio for the G.B. REED/EASTWARD HO is approximately 1.49.

RESUME

Nagtegaal, D. A., B. M. Leaman, and R. D. Stanley. 1986. Catches and trawl locations of R/V G.B. REED and M/V EASTWARD HO during Pacific ocean perch assessment cruise to Queen Charlotte Sound, August-September, 1984. Can. Data Rep. Fish. Aquat. Sci. 611: 109 p.

Le G.B. REED et le EASTWARD HO, un chalutier commercial canadien, ont effectué un relevé de la biomasse de sébastes à longue mâchoire dans le détroit de la Reine-Charlotte (passe des Îles Goose et passe Mitchell). Dans le cadre de ce relevé systématique stratifié, des échantillons ont été prélevés à tous les 36,5 m (20 brasses) de profondeur entre 146 et 291 m (de 80 à 159 brasses) de profondeur à des positions déterminées par Loran C. La biomasse estimative, basée sur la distance entre les panneaux du chalut en tant que largeur effective du trajet du chalut, s'élève à 2 512 + 84% t (GBR) et 2 401 + 119% t (EHO) dans la passe Mitchell, et à 6 763 + 64% t (GBR) et 16 201 + 54% t (EHO) dans la passe des Îles Goose. Ce relevé visait aussi une comparaison préliminaire des taux de capture entre le G.B. REED et le EASTWARD HO. Les résultats indiquent un rapport approximatif de 1,49 entre ces deux navires.

INTRODUCTION

A commercial trawl fishery, primarily directed towards Pacific ocean perch (Sebastes alutus), has existed in Queen Charlotte Sound since the early 1950s. Substantial amounts of rockfish (approx. 115,000 t) were removed from Queen Charlotte Sound by both the foreign and domestic fleets between 1965 and 1976. By mid-1980 all foreign trawl fleets had ceased fishing in Queen Charlotte Sound. A more complete and detailed description of the history of this fishery is contained in recent stock assessment documents (Ketchen 1980; Stocker 1981; Westrheim 1980).

As part of our stock assessment program the Fisheries Research Branch (and its predecessor, the Fisheries Research Board of Canada) has conducted trawl surveys in Queen Charlotte Sound to estimate the the biomass of Pacific ocean perch since 1965. Nine biomass surveys were undertaken between 1965 and 1977 by the G.B. REED using a swept-area technique (Westrheim et al. 1972). The purposes of the present assessment cruise were firstly to estimate the biomass of Pacific ocean perch in Queen Charlotte Sound (Goose Is. Gully and Mitchell's Gully), and secondly to compare catch rates and fishing techniques between the G.B. REED and a commercial trawler. The Fisheries Research Branch plans to replace the G.B. REED and because the new vessel will not be available for comparative fishing trials with the G.B. REED, we attempted to provide a comparative link through a commercial vessel that could also be compared with the new vessel. This data report presents the general results of this two-vessel, bottom-trawl survey conducted with the G.B. REED and the EASTWARD HO.

VESSEL AND GEAR

The two vessels used during the survey were the 53.9 m (177 ft) G.B. REED (Aug. 14-18, Aug. 26-Sept. 11) and the 32.6 m (107 ft) Canadian commercial trawler EASTWARD HO (Aug. 25-Sept. 9). Vessel specifications for the G.B. REED are listed in Appendix table 1 and for the EASTWARD HO in Appendix table 2. The same net and groundline arrangement were used by the G.B. REED as in past surveys (Appendix Fig. 1), while a typical commercial bottom trawl arrangement was used by the EASTWARD HO (Appendix Fig. 2). Both trawls were rigged for rough bottom trawling.

According to the original description of the Granton trawl groundline arrangement used by the G.B. REED (Harling and Westrheim 1966), each danleno assembly has a 53 cm (21 in) diameter steel bobbin and a butterfly plate connected to the headrope by a 2.7 m (9 ft) bridle and to the groundrope by a 3 m (10 ft) bridle. Prior to the cruise the top and bottom bridles on both sides were replaced and the bridles on one side were inadvertently reversed. Unfortunately, this error was not discovered until one month after the cruise and its effects on the fishing capabilities of the net are extremely difficult to quantify. Although the difference in length between the top and bottom bridles is small (0.3 m) it was assumed that the uneven hookup of bridles would have some minor detrimental effect.

FISHING LOCATIONS AND CATCH SAMPLING

In the past the G.B. REED has conducted trawl surveys on the major Pacific ocean perch fishing grounds in Queen Charlotte Sound. A stratified systematic survey was employed, occupying stations in each 36.5 m (20 fath) depth interval (146-181 m (80-99 fath) etc.) along selected Loran C lines between a depth range of 146 to 291 m (80-159 fath) (Westrheim et al. 1972). The present survey was based on this strategy according to the stations described in the previous biomass surveys (e.g., Westrheim et al. 1976). The G.B. REED made a set at each of the standard stations and then repeated the pattern while the EASTWARD HO made only one set at most of the standard stations, but made several additional sets at the mouths of the Goose Island and Mitchell's gullies. The duration of all hauls was limited to 30 minutes to conform with previous cruises.

On the EASTWARD HO, sampling of the catch was done in one of two general ways. For hauls <0.5 t the entire catch was sorted and weighed by species on a platform scale. For hauls >0.5 t the codend was fleeted aboard and weighed with an electronic load cell[a], emptied and reweighed to obtain the weight of the catch by difference. The catch was then subsampled to obtain species composition by weight. Sampling of the catch on board the G.B. REED was by the method of Westrheim (1967). The species composition of catches was determined by sorting and weighing the entire catch for small hauls, or subsampling (six-tub samples) of the catch and prorating, for larger hauls. Biological samples (length, sex, maturity, double otolith) were collected for Pacific ocean perch at each depth interval and locality. Some samples were also collected for *Sebastes brevispinis*, *S. reedi*, and *Merluccius productus*. All halibut were promptly measured and released.

RESULTS AND DISCUSSION

GENERAL

A total of 42 hauls were completed by the EASTWARD HO (Fig. 1) and 61 hauls by the G.B. REED (Fig. 2). Appendix tables 3 and 4 list the bridge log and catch data for the two vessels. Pacific ocean perch dominated the catch of both vessels, comprising 47% of the total for the G.B. REED and 59% of the total for the EASTWARD HO. Summaries of the catch weights by major species are contained in Tables 1 and 2.

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[a]Sea weigh, Measurement Systems Incorporated, Seattle Washington.

OCEANOGRAPHIC DATA

Oceanographic data was collected by the G.B. REED (Table 3) using an expendable bathythermograph at the standard stations in Queen Charlotte Sound (Fig. 3). Surface temperatures ranged from 13.7°C to 16.9°C while bottom temperatures ranged from 5.0°C to 9.4°C. We suspect that the surface temperature recorded for station 6 (84/08/16) was incorrectly read from the graph since it (18.8°C) was well above the average (Giovando 1985). The mean bottom temperature by depth interval for Mitchell's Gully between 201 and 329 m (110-180 fath) was slightly less than that for Goose Is. Gully between 210 and 357 m (115-195 fath), as was also the case in the 1976 survey.

BIOLOGICAL SAMPLING

The primary emphasis of biological sampling was to collect length, sex, maturity, and age data for Pacific ocean perch. Three gillraker samples (Table 4) were also collected on the G.B. REED as part of an ongoing study to determine whether the incidence and infection rate of a gillraker parasite (Neobrachiella robusta) can be used to identify stocks. Biological samples collected by the G.B. REED and the EASTWARD HO are listed in Tables 5 and 6, respectively.

The size composition of Pacific ocean perch (Tables 7 and 8) in Goose Is. Gully was trimodal with modes for males at 20 cm, 31 cm, and 38 cm and for females at 21 cm, 30 cm, and 41 cm (Table 9). The size ratio ranged from 46% to 52% males and varied with depth. The size composition in Mitchell's Gully (Tables 7 and 8) was also trimodal with modes for males at 21 cm, 29 cm, 38 cm and for females at 21 cm, 29 cm, and 40 cm (Table 10). The sex ratio ranged from 42 to 60% males in the samples from Mitchell's Gully. The size composition in both Goose Is. Gully and Mitchell's Gully varied considerably with depth. Smaller fish formed a greater proportion of the catch in the shallower depths. The size composition of Pacific ocean perch taken by the EASTWARD HO from outside Goose Is. Gully (Table 8) was more uniform with modes for males at 39 cm and 42 cm, and for females at 44 cm. Very few smaller and presumably younger fish were present in these samples. This was also the case for previous samples taken from this area during the summer (Nagtegaal et al. 1985).

In Goose Is. Gully the maturity condition (Table 11) of males was primarily either immature (54%) or maturing-small (33%), while females were almost equally divided into immature (27%), maturing-small (29%), and maturing-large (34%) (Tables 7, 8). A similar situation existed in Mitchell's Gully where 38% of the males were immature, 29% were maturing-small, 25% were resting, while most of the females were either maturing-large (56%) or immature (23%).

CATCH RATES

Mean catch rates by depth and vessel for Goose Is. Gully and Mitchell's Gully are contained in Tables 9 and 10, respectively. In Goose Is. Gully the highest catch rates for both the G.B. REED and the EASTWARD HO were recorded in the 182-218 m (100-119 fath) depth interval. Although catch rates did vary among depths the direct correspondence with depth noted in previous surveys was not observed (Harling and Davenport 1977). The highest catch rate for the EASTWARD HO in Mitchell's Gully was recorded in the 219-254 m (120-139 fath) depth interval. The G.B. REED recorded its highest catch rate in the 292-327 m (160-179 fath) interval although the differences in catch rates between 182-218 m and 292-327 m intervals were minimal. The catch rates recorded on the two previous G.B. REED surveys (Tables 9 and 10) were comparable to the 1984 survey results although the latter tended to be higher in the shallower depth intervals and lower in the deeper intervals. In Tables 9 and 10 the numbers of Pacific ocean perch caught per hour are not presented for the 1984 survey, since the numbers of fish by haul were not recorded. The values of the two previous surveys are listed for reference only.

BIOMASS ESTIMATES

Preliminary biomass estimates were calculated for Pacific ocean perch by 36 m (20 fath) depth interval according to the following equation (after Westrheim et al. 1972):

$$B_\tau = \sum_{i=1}^{n} \left(\frac{\overline{CPUE}_i}{K_a}\right) (A_i)\ (c)$$

Where B_τ = estimated total biomass over all depth intervals (t);

$\overline{CPUE}_i$ = mean catch per hour trawled in the ith depth interval (t/hr); K_a = area of bottom trawled in one hour (naut. mi^2); A_i = total area of the ith depth interval (naut. mi^2); c = catching coefficient of the trawl gear.

The value for K_a was calculated as the product of vessel speed and effective path width (horizontal opening) of the trawl gear. According to Westrheim et al. (1972) the K_a for the G.B. REED was based on a horizontal net opening of 9 m (29 ft) and an average trawling speed of 3 kts. In 1977, a new K_a value (.026727 naut. mi^2) was obtained, based on an improved estimate of 15 m (50 ft) for the horizontal net opening (Harling et al. 1979). Both these estimates of K_a assume that the effective path width of the trawl is the distance between the wings of the net.

Leaman and Nagtegaal (1982) argue that there is sufficient evidence to believe that the effective path width of a trawl is the distance between the trawl doors. For this reason, we chose to calculate a new K_a value based on trawl door spread. The estimate for trawl door spread was determined using Carrothers' (1980) program assuming the value of the horizontal net opening (wingspread) to be 15 m (50 ft) as per Harling et al. (1979). For comparison purposes both this new value (.0972166) and the second K_a value used by Harling et al. were incorporated into biomass calculations. An increase in K_a translates into a 1:1 decrease in the biomass estimate.

The K_a value for the EASTWARD HO (.0568804 naut. mi^2) was also calculated using the technique developed by Carrothers (1980) assuming that the effective path width of the trawl was the distance between the doors. The wingspread for the GOUROCK 500 rockhopper trawl used by the EASTWARD HO was estimated on the basis of data collected on wingspread measurements for similar nets by the U.S. National Marine Fisheries Service (Anon. 1978). Measurements were collected using net-sounder transducers for an Eastern trawl with a footrope of 34 m (112 ft) and a headrope of 25 m (83 ft). It was assumed that the wingspread for the trawl used by the EASTWARD HO would be at least equal to or greater than the wingspread estimate of 17 m (55 ft) for the Eastern trawl since both the footrope and headrope length were greater.

The catching coefficient (c) for both the EASTWARD HO and the G.B. REED was taken to be 1.0; factors affecting the estimate of c are not well understood (Leaman and Nagtegaal 1982).

A_i values for Mitchell's Gully were taken from Westrheim (1974) and for Goose Is. Gully from Westrheim (1972) and are presented in Table 12.

Estimates of total and marketable ($\geq$31 cm FL) Pacific ocean perch biomass by depth interval for Goose Is. Gully and Mitchell's Gully are listed in Table 13. Estimates for marketable biomass were calculated by converting the appropriate length frequency data (males and females combined) by depth interval and area to weight per size interval using the length-weight formula (Westrheim and Thomson 1971):

$$W = 0.0088955L^{3.13325}$$

The proportion by weight of fish greater than or equal to 31 cm was then applied to the total biomass value.

A summary of the biomass estimates (mt) of marketable size ($\geq$31 cm) Pacific ocean perch from this and previous surveys is presented below:

Date	Vessel	Mitchell's Gully A[a]	Mitchell's Gully B[b]	Goose Is. Gully A[a]	Goose Is. Gully B[b]
Aug. 1965	G.B. REED			17485	63600
Aug. 1966	"			12508	45500
Sep. 1967	"			14901	54200
Sep. 1969	"			14240	51800
Jun. 1970	"			10116	36800
Aug. 1971	"	5663	20600	-	-
Oct. 1971	"	-	-	10749	39100
Sep. 1973	"	5113	18600	6130	22300
Sep. 1974	"	5663	20600	-	-
Sep. 1976	"	5333	19400	9099	33100
Aug. 1977	"	3079	11200	6323	23000
Aug.-Sep. 1984	"	2512±84%	9133±84%	6763±64%	24591±64%
Aug.-Sep. 1984	EASTWARD HO	2401±119%[c]	-	16201±54%[c]	-

Footnotes to table:

[a]Biomass calculation based on doorspread using a K_a value of .0972166.

[b]Biomass calculation based on wingspread using a K_a value of .026727.

[c]Biomass calculation based on doorspread using a K_a value of .0568804.

Note: values for the G.B. REED in column A from 1965 to 1977 are the adjusted values from column B (from Harling and Davenport 1977).

Confidence limits (95%) were calculated according to Leaman and Nagtegaal (1982) as follows:

$$B_\tau \pm t(_{.95,n_e}) \sqrt{VAR\ B_\tau}$$

where n_e (effective degrees of freedom) was derived by the formula of Satterthwaite (1946).

Column A for both Goose Is. Gully and Mitchell's Gully refers to the biomass estimate based on the doorspread as the effective path width of the trawl and column B refers to the estimate based on the wingspread.

Comparison of these estimates over time regardless of whether they are based on wingspread or doorspread reflects a decreasing trend in biomass for both areas and indicates a continued low level of biomass for both Goose Is. Gully and Mitchell's Gully.

While it is to be expected that there would be some differences in biomass estimates between the two vessels due to catching power (see next section), it is apparent when comparing the Goose Is. and Mitchell's gullies estimates that other factors must also be involved. The two vessels produced almost the same estimate for the biomass of S. alutus in Mitchell's Gully yet those for Goose Is. Gully differed by approximately 2.4 times. The temporal proximity of fishing by the vessels in Mitchell's Gully (Appendix tables 3 and 4) and the similarity of the biomass estimates, when compared with the Goose Is. Gully fishing and results, suggests an additional source of variation or bias associated with time. We examined this possibility by comparing replicate hauls at the same stations by the G.B. REED. Table 14 shows that the G.B. REED had lower (53.4%) mean difference between replicate hauls in Mitchell's Gully than in Goose Is. Gully (91.6%). The replicate hauls were only 6-9 days apart in Mitchell's Gully but were up to 22 days apart for Goose Is. Gully.

We believe it is significant that the similarity in biomass between the two vessels for Mitchell's Gully is associated with almost coincident fishing, while the large differences in the Goose Is. Gully estimates are associated with a large time gap between fishing by the two vessels. The mean catch rate for the first tows by the G.B. REED in Goose Is. Gully was 655 kg/hr while that of the replicates was over 1200 kg/hr. In comparison, the equivalent figure for Mitchell's Gully were 704 kg/hr and 819 kg/hr, respectively. It is apparent that such effects may be major factors on both the accuracy and precision of survey results.

COMPARISON OF VESSEL CATCH RATES

Table 15 lists the catch per unit effort for comparable hauls of the G.B. REED and the EASTWARD HO. At all stations except one the G.B. REED made two tows while the EASTWARD HO made only one. The catch ratio therefore compares the mean CPUE for the G.B. REED to the CPUE for the EASTWARD HO. Preliminary comparison of these catch rates indicates that the CPUE for the G.B. REED was approximately double that of the EASTWARD HO. This ratio is highly influenced by a single EASTWARD HO haul (No. 19) where the catch was very small. Removal of this haul from the comparison (Table 15) provides what we regard as a more realistic estimate of the G.B. REED/EASTWARD HO catch ratio of 1.49. A more extensive study involving the G.B. REED and two other vessels (Kimura et al. 1978) compared the relative fishing power of different fishing gears and attempted to detect differences in species composition attributable to fishing gear. Among other parameters that are assumed to affect fishing power it was hypothesized that dandyline length and trawl door dimensions may have a considerable effect on catch rates. In 1977, Harling and Davenport (1977) conducted a preliminary comparison between sweepline length and catch rates and found that, for the same net, an increase in sweepline length from 36 m (20 fath) to 64 m (35 fath) resulted in twice the catch rate. Although no direct tests were made to compare sweepline length with catch rates for this study, it is interesting to note that the sweepline length ratio for the G.B. REED/EASTWARD HO is 1:50.

Lastly the temporal differences in fishing the same stations by the two vessels provided an added source of variation, not accounted for here (see previous section). The major impact of this effect is to confound the understanding of real differences between the vessels. An accurate measure of the latter would, in view of this temporal variability, require coincident fishing by the vessels.

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Table 1. Summary of catch by species, R/V G.B. REED, Aug. 14-18, Aug. 26-Sept. 11, 1984. (Refer to Appendix table 5 for scientific and common names of species.)

Species	Catch (kg)	Percent of total catch
Pacific ocean perch	23176	47
Arrowtooth flounder	5815	12
Red-banded rockfish	3378	7
Dover sole	2629	5
Silvergrey rockfish	2208	4
Short-spine thornyhead	1602	3
Walleye pollock	1288	3
Sablefish	1275	3
Splitnose rockfish	1221	2
Dogfish	934	2
Rex sole	844	2
Hake	642	1
Skate	537	1
Red stripe rockfish	519	1
Others[a]	4551	7
Total	49017	100

[a]Includes all species that comprised <1% of the total catch.

Table 2. Summary of catch by species, M/V EASTWARD HO, Aug. 25-Sept. 9, 1984. (Refer to Appendix table 5 for scientific and common names of species.)

Species	Catch (kg)	Percent of total catch
Pacific ocean perch	31872	59
Silvergrey rockfish	3172	6
Splitnose rockfish	2673	5
Canary rockfish	2595	5
Yellowmouth rockfish	2530	5
Red-banded rockfish	2047	4
Sharpchin rockfish	1744	3
Arrowtooth flounder	1375	2
Walleye pollock	1130	2
Sablefish	884	2
Dover sole	679	1
Shortspine thornyhead	554	1
Others[a]	3022	5
Total	54277	100

[a]Includes all species that comprised <1% of the total catch.

Table 3. Oceanographic data for XBT stations in Queen Charlotte Sound, R/V G.B. REED, Aug. 14-18, Aug. 25-Sept. 9, 1984. (Refer to Fig. 3.)

Station no.	Date (YY/MM/DD)	Time (PDT)	Latitude	Longitude	Surface (°C)	Bottom (°C)	XBT depth (m)
1	84/08/15	09:08	51°07.0'	128°20.0'	13.7	6.6	196
2		15:43	51°15.0'	128°40.0'	15.0	6.1	192
3		21:14	51°33.0'	128°13.0'	14.6	7.7	90
4		22:10	51°29.0'	128°26.5'	16.6	6.1	188
5		23:10	51°24.0'	128°42.5'	16.6	7.8	219
6	84/08/16	00:25	51°18.5	129°00.0'	18.8	7.5	245
7		01:40	51°13.0'	129°17.0'	16.4	5.7	293
8		20:48	51°07.0'	129°37.0'	16.5	6.1	357
9		22:23	51°00.0'	130°00.0'	16.0	5.5	650
G4	84/08/17	16:52	51°00.0'	129°00.0'	16.5	8.3	82
G5		17:42	51°00.0'	128°45.0'	16.6	8.3	64
G6		18:45	51°00.0'	128°29.0'	16.7	7.4	84
G7		19:35	50°58.0'	128°13.0'	16.6	9.4	64
10	84/08/30	19:25	51°21.0'	129°49.0'	16.5	6.0	240
11		20:48	51°35.0'	130°00.0'	16.5	6.3	238
12		21:45	51°43.2'	129°50.0'	16.8	5.8	347
13	84/08/31	20:00	51°52.0'	129°40.0'	16.6	6.0	269
14	84/09/01	19:53	52°00.0'	129°30.0'	16.6	6.0	205
1	84/09/03	17:14	51°07.0'	128°20.0'	16.9	6.7	183
7	84/09/04	20:40	51°13.0'	129°17.0'	16.6	6.5	304
8		22:00	51°07.0'	129°37.0'	16.9	6.4	360
9		23:38	51°00.0'	130°00.0'	16.6	5.0	650
G1	84/09/05	00:56	51.00.0'	129°40.0'	16.6	5.5	519
G2		01:33	51°00.0'	129°30.0'	16.6	7.0	238
G3		02:29	51°00.0'	129°15.0'	16.6	7.1	155
6		23:24	51°18.5'	129°00.0'	16.6	6.2	247
5	84/09/06	19:20	51°24.0'	128°42.5'	16.6	6.0	219
4		20:58	51°29.0'	128°26.5'	16.7	6.1	188
3		31:55	51°33.0'	128°13.0'	16.5	7.8	90
2	84/09/09	20:38	51°15.0'	128°40.0'	16.6	6.4	196
1		21:58	51°07.0'	128°20.0'	16.6	6.5	185

Table 4. Size composition of Pacific ocean perch examined for gill parasites.

Haul Length (cm)	17		25		33	
	M	F	M	F	M	F
30	-	-	-	-	-	-
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	1	3	-	-	3	3
4	0	2	1	-	3	1
35	1	1	0	-	2	2
6	0	0	2	-	1	0
7	3	1	8	-	2	0
8	3	0	6	1	0	0
9	2	3	2	5	0	0
40	3	1	6	7	3	0
1	2	4	1	5	2	0
2	-	4	-	3	2	4
3	-	1	-	1	1	6
4	-	8	-	1	-	4
45	-	3	-	-	-	4
6	-	1	-	-	-	2
7	-	1	-	-	-	3
8	-	-	-	-	-	-
9	-	-	-	-	-	-
50	-	-	-	-	-	-
Total	15	33	25	23	19	29

Table 5. Summary of biological samples taken, R/V G.B. REED, Aug. 14-18, Aug. 26-Sept. 11, 1984.

Species	Sample type		
	L/S/MAT	L/S/MAT/OTO	L/S/MAT/OTO/GILL
Sebastes alutus	118	3145	144
S. brevispinis	290	100	-
Merluccius productus	77	-	-
Total	485	3245	144

Table 6. Summary of biological samples taken, M/V EASTWARD HO, Aug. 25-Sept. 9, 1984.

Species	Sample type L/S/MAT/OTO
Sebastes alutus	900
S. reedi	100
Total	1000

Table 7. Size composition and maturity data by area and haul, R/V/ G.B. REED, Aug-Sept. 1984.

S. alutus

AREA	CAPE SCOTT SPIT								TOTAL	
DATE	150884		150884		150884		290884			
DEPTH	170		199		219		208			
SET	001		002		003		020			
	M	F	M	F	M	F	M	F	M	F
LENGTH (CM)										
13	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
15	3	1	2	0	2	0	0	0	7	1
16	6	3	5	0	0	1	0	0	11	4
17	3	2	1	0	0	0	0	0	4	2
18	1	0	0	0	1	0	0	0	2	0
19	1	0	3	2	2	1	0	0	6	3
20	6	6	10	8	3	4	3	0	22	18
21	6	5	4	8	9	5	1	3	20	21
22	6	9	5	1	3	2	0	1	14	13
23	3	3	1	1	2	5	2	0	8	9
24	2	1	3	0	0	1	1	0	6	2
25	3	1	0	0	1	2	0	0	4	3
26	1	3	1	2	0	1	0	0	2	6
27	0	0	0	0	0	0	0	1	0	1
28	1	0	1	1	0	1	1	0	3	2
29	6	3	3	2	2	0	0	0	11	5
30	6	5	0	1	1	2	0	2	7	10
31	9	9	10	5	0	1	1	1	20	16
32	15	15	7	10	1	2	0	2	23	29
33	12	13	6	3	1	4	1	2	20	22
34	6	9	0	4	1	1	1	1	8	15
35	0	2	0	3	1	2	0	0	1	7
36	0	0	1	0	0	0	1	0	2	0
37	0	0	1	0	2	1	1	0	4	1
38	0	1	1	0	5	0	1	0	7	1
39	1	0	5	0	2	0	6	0	14	0
40	0	0	10	0	1	3	6	0	17	3
41	0	0	7	0	2	2	9	0	18	2
42	2	0	17	0	0	2	7	3	26	5
43	0	0	8	0	0	2	6	8	14	10
44	0	0	3	1	0	5	0	5	3	11
45	0	0	1	8	0	1	0	9	1	18
46	0	0	1	10	0	5	0	5	1	20
47	0	0	0	9	0	2	0	1	0	12
48	0	0	0	4	0	1	0	1	0	6
49	0	0	0	0	0	0	0	1	0	1
TOTAL	99	91	117	83	42	59	48	46	306	279

Table 7 (cont'd) S. alutus

MATURITIES	M	F	M	F	M	F	M	F	M	F
1	59	33	50	23	25	21	9	6	143	83
2	38	51	64	23	16	16	17	7	135	97
3	0	5	1	29	1	15	0	32	2	81
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	1	0	0	0	0	0	1	0
7	2	2	1	8	0	7	18	1	21	18
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	4	0	4	0

Table 7 (cont'd) S. alutus

AREA	SE. GOOSE IS. GULLY													
DATE	160884		160884		160884		160884		160884		170884		270884	
DEPTH	201		234		271		274		234		201		234	
SET	004		005		006		007		008		009		011	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
LENGTH (CM)														
13	0	1	0	0	1	0	0	0	0	0	0	0	0	0
14	5	0	0	0	0	0	0	0	0	0	0	0	0	0
15	2	1	2	0	0	0	1	0	0	0	1	2	0	0
16	3	0	0	1	0	0	0	0	1	0	2	0	0	0
17	0	0	1	0	0	0	0	0	0	0	0	2	0	0
18	0	0	0	0	0	0	0	0	0	0	1	1	0	0
19	0	1	2	0	0	0	0	0	2	1	2	3	0	0
20	1	0	6	1	0	0	0	0	3	1	3	2	0	0
21	3	1	1	3	0	0	1	1	3	0	2	1	1	0
22	2	0	2	0	0	0	2	0	3	2	1	0	1	2
23	1	0	0	0	0	0	0	0	0	2	1	0	2	1
24	1	0	0	0	0	0	0	0	0	0	2	0	1	0
25	0	0	0	0	0	0	0	0	1	1	0	0	0	0
26	0	1	0	0	0	0	0	0	0	1	0	0	2	2
27	0	1	0	0	0	0	2	2	3	1	0	0	0	2
28	0	0	0	2	2	0	2	0	2	1	1	0	6	4
29	1	0	1	1	2	3	13	9	4	4	3	3	9	2
30	2	3	1	2	6	3	5	8	4	11	5	4	13	9
31	2	2	1	3	7	6	7	7	3	5	5	4	4	7
32	0	0	2	1	3	1	0	1	3	5	3	1	1	5
33	0	3	3	0	0	4	3	4	4	4	2	2	0	2
34	3	1	4	0	3	2	1	0	5	1	4	1	1	1
35	5	3	3	1	3	1	4	0	3	2	2	5	0	0
36	0	3	0	4	2	2	1	2	2	1	1	2	0	0
37	0	1	1	1	4	3	1	2	0	0	0	5	1	0
38	4	0	7	1	3	2	3	2	5	1	0	0	2	0
39	7	0	3	1	2	6	1	2	1	0	5	2	0	1
40	4	3	6	2	1	5	1	1	0	0	2	3	1	3
41	1	1	3	5	0	8	0	1	0	1	1	2	1	2
42	4	2	1	6	1	7	2	4	0	1	1	4	1	2
43	1	3	1	6	0	3	0	1	0	0	0	0	1	2
44	1	5	0	4	0	2	0	1	0	1	0	0	0	2
45	0	6	0	2	0	1	0	1	0	0	0	0	0	2
46	0	2	0	2	0	1	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	53	44	51	49	40	60	50	49	52	47	50	49	48	51

Table 7 (cont'd) S. alutus

MATURITIES	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	21	5	16	5	15	0	27	3	30	9	29	12	39	11
2	32	15	32	15	24	19	23	29	21	30	21	21	9	0
3	0	9	2	20	1	28	0	12	0	8	0	11	0	40
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	14	1	9	0	12	0	5	1	0	0	5	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 7 (cont'd) S. alutus

AREA	SE. GOOSE IS. GULLY										TOTAL	
DATE	270884		270884		290884		300884		060984			
DEPTH	166		201		245		269		199			
SET	013		014		019		023		049			
	M	F	M	F	M	F	M	F	M	F	M	F
LENGTH (CM)												
13	0	0	0	0	0	0	0	0	0	0	1	1
14	0	0	0	0	0	0	0	0	0	0	5	0
15	2	0	0	0	0	0	0	0	1	0	9	3
16	5	2	0	0	0	0	0	0	0	0	11	3
17	0	2	0	0	0	0	0	0	1	0	2	4
18	3	0	0	0	0	0	0	0	0	0	4	1
19	3	3	0	1	0	0	0	1	3	2	12	12
20	7	11	1	0	0	0	1	0	6	1	28	16
21	9	8	1	0	0	0	4	0	4	1	29	15
22	5	4	0	1	0	0	0	0	4	0	20	9
23	4	3	0	1	0	0	2	1	2	1	12	9
24	6	6	0	0	0	0	0	1	0	0	10	7
25	2	2	2	0	0	0	0	0	1	0	6	3
26	1	1	0	0	0	0	0	0	0	1	3	6
27	0	1	0	0	0	0	0	0	0	0	5	7
28	0	2	0	1	0	1	0	0	2	0	15	11
29	4	0	2	3	1	0	5	1	2	1	47	27
30	1	0	3	7	2	1	1	2	2	0	45	50
31	1	0	7	9	5	0	3	0	2	4	47	47
32	0	0	9	8	2	2	1	2	1	0	25	26
33	0	0	3	3	0	0	0	1	1	2	16	25
34	0	0	0	3	0	0	1	0	2	2	24	11
35	0	0	1	1	0	1	3	1	3	2	27	17
36	0	0	0	0	0	0	3	1	1	3	10	18
37	0	0	3	2	2	0	4	1	3	2	19	17
38	0	0	2	1	6	0	4	5	5	2	41	14
39	0	0	0	1	4	0	7	4	3	1	33	18
40	0	0	4	3	6	3	3	6	6	0	34	29
41	0	1	0	3	5	4	1	10	1	1	13	39
42	0	0	0	6	4	3	1	5	2	4	17	44
43	0	0	1	3	0	7	0	7	1	5	5	37
44	0	0	0	2	0	8	0	1	0	3	1	29
45	0	0	0	0	0	3	0	0	0	2	0	17
46	0	0	0	1	0	2	0	0	0	0	0	8
47	0	0	0	0	0	0	0	1	0	0	0	1
48	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	53	46	39	60	37	35	44	51	59	40	576	581

Table 7 (cont'd) S. alutus

MATURITIES	M	F	M	F	M	F	M	F	M	F	M	F
1	53	45	28	21	9	4	16	6	31	7	314	128
2	0	0	11	22	17	1	3	9	15	14	208	175
3	0	1	0	16	0	30	0	36	0	19	3	230
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	1	10	0	17	0	7	0	36	46
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	1	0	8	0	6	0	15	0

Table 7 (cont'd) S. alutus

AREA	NE. GOOSE IS. GULLY						TOTAL	
DATE	280884		290884		290884			
DEPTH	168		201		161			
SET	015		017		018			
LENGTH (CM)	M	F	M	F	M	F	M	F
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	1	0	0	0	0	0	1	0
16	0	1	0	0	0	0	0	1
17	0	0	0	0	1	0	1	0
18	0	0	0	0	0	0	0	0
19	5	2	0	1	1	0	6	3
20	8	14	1	0	6	0	15	14
21	6	11	1	0	8	5	15	16
22	8	4	3	4	4	2	15	10
23	4	2	0	1	5	3	9	6
24	7	5	0	0	5	4	12	9
25	4	3	0	1	2	0	6	4
26	1	3	0	0	2	3	3	6
27	0	0	0	1	0	2	0	3
28	0	0	3	1	3	2	6	3
29	0	0	4	3	5	6	9	9
30	2	2	3	4	7	6	12	12
31	1	1	7	4	8	3	16	8
32	1	0	2	6	2	1	5	7
33	0	1	1	2	1	7	2	10
34	0	1	0	2	0	2	0	5
35	0	0	1	1	0	0	1	1
36	0	0	0	0	1	1	1	1
37	0	0	3	1	0	0	3	1
38	1	0	4	0	1	1	6	1
39	0	0	2	3	0	0	2	3
40	0	0	3	1	1	0	4	1
41	0	0	2	4	0	0	2	4
42	0	0	0	4	0	1	0	5
43	0	0	0	1	0	0	0	1
44	0	0	1	8	0	1	1	9
45	0	0	0	3	0	1	0	4
46	0	0	0	1	0	0	0	1
47	0	0	0	1	0	1	0	2
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
TOTAL	49	50	41	58	63	52	153	160

Table 9. Pacific ocean perch mean catch rates, modal sizes, and sex ratio, by 36 m (20 fath) depth interval, in Goose Is. Gully.

Depth interval (m)	Survey	No. of hauls	Kg/hr	No./hr	Mode[b] (cm)	Percent males
146-181 (m)	GBR84-1	10	251 (±176)[a]		20:33	52
	EH084-1	2	117 (±504)			
	GBR77-3	7	98	201	34:18	42
	GBR76-3	7	201	358	36:18:14	51
182-218	GBR84-1	15	1036 (±628)		42:31:20	46
	EH084-1	7	1589 (±872)			
	GBR77-3	10	806	1028	38:46:22	49
	GBR76-3	15	1248	1730	36:30:18	52
219-254	GBR84-1	10	772 (±243)		30:38:21	48
	EH084-1	4	821 (±598)			
	GBR77-3	8	828	1029	38	51
	GBR76-3	7	1084	1253	38:30:24	47
255-291	GBR84-1	6	877 (±844)		42:29	46
	EH084-1	5	1562 (±560)			
	GBR77-3	6	1087	1258	38	48
	GBR76-3	6	1539	1896	38:30	53

[a]95% confidence limits in parenthesis.

[b]Modes for males and females combined in order of magnitude.

Table 10. Pacific ocean perch mean catch rates, modal sizes, and sex ratio, by 35 m (20 fath) depth interval, in Mitchell's Gully.

Depth interval (m)	Survey	No. of hauls	Kg/hr	No./hr	Mode[b] (cm)	Percent males
182-218	GBR84-1	3	903 (±1158)[a]		30:20	57
	EH084-1	1	266			
	GBR77-3	1	461	736	34:44:20	40
	GBR76-3	4	655	1079	34:44	48
219-254	GBR84-1	4	890 (±646)		39:21	57
	EH084-1	4	1016 (±835)			
	GBR77-3	2	473	668	36	49
	GBR76-3	4	1060	1346	36:40	49
255-291	GBR84-1	4	612 (±294)		40	60
	EH084-1	3	277 (±321)			
	GBR77-3	2	1280	1505	40	34
	GBR76-3	4	1185	1371	40	35
292-327	GBR84-1	4	935 (±1082)		39	60
	EH084-1	2	414 (±534)			
	GBR77-3	3	489	574	38	56
	GBR76-3	4	1077	1324	38	57
328-364	GBR84-1	4	404 (±223)		40	42
	EH084-1	3	157 (±239)			
	GBR77-3	2	862	1072	38	66
	GBR76-3	4	634	719	40	59

[a]95% confidence limits in parenthesis.

[b]Modes for males and females combined in order of magnitude.

Table 7 (cont'd) S. alutus

MATURITIES	M	F	M	F	M	F	M	F
1	48	44	26	12	57	27	131	83
2	1	6	10	20	1	21	12	47
3	0	0	0	26	0	4	0	30
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	5	0	2	0	7	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	3	0	3	0

Table 7 (cont'd) S. alutus

AREA	MITCHELL'S GULLY													
DATE	310884		310884		310884		010984		010984		010984		010984	
DEPTH	353		313		234		274		322		282		240	
SET	025		026		027		028		029		030		031	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
LENGTH (CM)														
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	1	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	1	0	0	0	0	0	0	0	0	0
19	0	0	0	0	1	1	0	0	0	0	0	0	0	0
20	0	0	0	0	4	2	0	0	0	0	1	0	0	0
21	0	0	0	0	7	4	0	0	0	0	1	0	0	0
22	0	0	0	0	2	2	0	0	0	0	1	0	1	0
23	0	0	0	0	4	1	0	0	0	0	1	0	0	0
24	0	0	0	0	0	1	0	0	0	0	0	0	0	0
25	0	0	0	0	4	1	0	0	0	0	0	0	1	0
26	0	0	0	0	0	1	0	0	0	0	0	0	3	1
27	1	0	0	0	0	0	1	0	0	0	1	1	3	3
28	0	0	0	0	1	3	1	0	1	0	4	1	10	5
29	0	0	0	0	4	3	0	2	1	0	5	6	13	12
30	0	0	1	1	3	3	0	3	0	0	4	5	13	6
31	0	0	0	1	4	1	1	3	1	1	4	0	3	5
32	0	0	0	1	0	0	0	1	0	0	2	2	2	5
33	1	0	0	0	3	3	1	1	0	0	0	0	2	0
34	1	0	0	0	0	4	0	0	2	1	1	1	0	0
35	0	0	4	0	3	2	2	0	3	1	1	1	0	0
36	4	0	12	1	1	2	2	0	9	0	2	1	0	1
37	10	0	6	0	1	1	5	1	8	1	6	0	1	0
38	11	4	15	1	1	1	11	0	7	2	7	1	3	0
39	3	7	12	4	2	0	17	1	11	6	3	2	1	0
40	7	20	4	6	2	1	15	5	8	9	4	7	2	1
41	3	15	1	11	2	0	4	3	1	10	0	8	1	0
42	0	5	2	8	1	2	3	3	0	4	0	3	1	0
43	0	3	0	0	0	2	2	7	1	6	0	6	0	0
44	0	1	0	0	0	2	0	0	0	0	0	0	0	0
45	0	0	0	0	0	1	0	1	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	1	0	0	0	0	0
47	0	0	0	0	0	3	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	41	55	57	34	52	47	65	31	54	41	48	45	60	39

Table 7 (cont'd) S. alutus

MATURITIES	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	1	0	1	1	39	23	2	1	4	0	24	5	46	19
2	15	0	39	3	9	11	26	9	27	4	7	13	6	18
3	0	53	0	30	0	13	0	19	0	36	0	27	0	2
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	1	0	0	0	0	0	0	0	0	0	0	0	0
7	21	1	17	0	3	0	35	2	21	1	14	0	4	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	4	0	0	0	1	0	2	0	2	0	3	0	4	0

Table 7 (cont'd) S. alutus

AREA	MITCHELL'S GULLY						TOTAL	
DATE	010984		020984		080984			
DEPTH	203		199		351			
SET	032		033		053			
	M	F	M	F	M	F	M	F
LENGTH (CM)								
13	0	0	1	0	0	0	1	0
14	0	0	0	0	0	0	1	0
15	1	0	2	0	0	0	3	0
16	1	0	1	0	0	0	2	0
17	0	1	2	0	0	0	2	1
18	2	0	3	0	0	0	6	0
19	0	1	4	1	0	0	5	3
20	1	1	7	1	0	0	13	4
21	1	2	4	1	0	0	13	7
22	0	2	1	2	0	0	5	6
23	3	0	2	2	0	0	10	3
24	1	1	2	4	0	0	3	6
25	2	2	2	0	0	0	9	3
26	6	1	4	0	0	0	13	3
27	3	3	0	4	0	0	9	11
28	6	4	4	0	0	0	27	13
29	7	9	2	3	1	0	33	35
30	7	12	4	4	0	0	32	34
31	9	3	7	3	0	0	29	17
32	0	5	1	2	0	0	5	16
33	1	0	3	3	1	0	12	7
34	0	0	3	1	0	0	7	7
35	0	0	2	2	0	3	15	9
36	0	0	1	0	2	0	33	5
37	0	0	2	0	8	0	47	3
38	0	0	0	0	14	3	69	12
39	0	0	0	0	10	9	59	29
40	0	0	3	0	1	17	46	66
41	0	0	2	0	1	11	15	58
42	0	0	2	4	1	9	10	38
43	0	0	1	6	0	3	4	33
44	0	1	0	4	0	0	0	8
45	0	0	0	4	0	0	0	6
46	0	0	0	2	0	0	1	2
47	0	0	0	3	0	0	0	6
48	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0
TOTAL	51	48	72	56	39	55	539	451

Table 7 (cont'd) S. alutus

MATURITIES	M	F	M	F	M	F	M	F
1	42	35	48	18	2	0	209	102
2	1	12	5	14	24	3	159	87
3	0	1	0	24	0	52	0	257
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	1
7	0	0	8	0	13	0	136	4
8	0	0	0	0	0	0	0	0
9	8	0	11	0	0	0	35	0

Table 7 (cont'd) S. alutus

			TOTAL		GRAND TOTAL	
AREA	TRIANGLE IS.					
DATE	050984					
DEPTH	269					
SET	043					
	M	F	M	F	M	F
LENGTH (CM)						
13	0	0	0	0	2	1
14	0	0	0	0	6	0
15	0	0	0	0	20	4
16	0	0	0	0	24	8
17	0	0	0	0	9	7
18	0	0	0	0	12	1
19	0	0	0	0	29	21
20	0	0	0	0	78	52
21	0	0	0	0	77	59
22	0	0	0	0	54	38
23	1	1	1	1	40	28
24	0	0	0	0	31	24
25	0	0	0	0	25	13
26	0	0	0	0	21	21
27	0	1	0	1	14	23
28	1	0	1	0	52	29
29	1	1	1	1	101	77
30	1	1	1	1	97	107
31	1	2	1	2	113	90
32	2	1	2	1	60	79
33	2	1	2	1	52	65
34	0	0	0	0	39	38
35	0	0	0	0	44	34
36	3	0	3	0	49	24
37	6	0	6	0	79	22
38	17	0	17	0	140	28
39	4	0	4	0	112	50
40	5	2	5	2	106	101
41	4	7	4	7	52	110
42	1	11	1	11	54	103
43	2	8	2	8	25	89
44	0	5	0	5	5	62
45	0	6	0	6	1	51
46	0	1	0	1	2	32
47	0	0	0	0	0	21
48	0	0	0	0	0	6
49	0	0	0	0	0	1
TOTAL	51	48	51	48	1625	1519

Table 7 (cont'd) S. alutus

MATURITIES	M	F	M	F	M	F
1	8	5	8	5	805	401
2	21	3	21	3	535	409
3	0	40	0	40	5	638
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	1	1
7	18	0	18	0	218	68
8	0	0	0	0	0	0
9	4	0	4	0	61	0

Table 7 (cont'd) S. brevispinis

			TOTAL		GRAND TOTAL	
AREA	SE. GOOSE IS. GULLY					
DATE	270884					
DEPTH	157					
SET	012					
	M	F	M	F	M	F
LENGTH (CM)						
40	1	0	1	0	1	0
41	0	0	0	0	0	0
42	1	0	1	0	1	0
43	0	0	0	0	0	0
44	2	1	2	1	2	1
45	3	0	3	0	3	0
46	2	4	2	4	2	4
47	1	5	1	5	1	5
48	8	9	8	9	8	9
49	3	5	3	5	3	5
50	4	5	4	5	4	5
51	3	7	3	7	3	7
52	2	2	2	2	2	2
53	5	6	5	6	5	6
54	2	4	2	4	2	4
55	1	2	1	2	1	2
56	0	5	0	5	0	5
57	0	2	0	2	0	2
58	0	3	0	3	0	3
59	0	1	0	1	0	1
TOTAL	38	61	38	61	38	61
MATURITIES						
1	15	11	15	11	15	11
2	1	0	1	0	1	0
3	0	0	0	0	0	0
4	0	1	0	1	0	1
5	0	0	0	0	0	0
6	2	31	2	31	2	31
7	20	17	20	17	20	17
8	0	0	0	0	0	0
9	0	0	0	0	0	0

Table 8. Size composition and maturity data by area and haul, M/V EASTWARD HO, Aug-Sept, 1984.

S. alutus

AREA	OUTSIDE GOOSE IS. GULLY								TOTAL	
DATE	280884		280884		290884		290884			
DEPTH	280		271		298		254			
SET	002		003		004		006			
	M	F	M	F	M	F	M	F	M	F
LENGTH (CM)										
20	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	1	0	0	0	1	0
31	0	0	0	0	0	0	0	0	0	0
32	0	1	0	0	1	0	0	0	1	1
33	0	0	0	0	3	2	1	0	4	2
34	0	0	0	0	1	2	3	0	4	2
35	0	1	1	0	6	3	4	3	11	7
36	0	0	3	0	8	1	4	1	15	2
37	3	1	5	0	13	1	0	0	21	2
38	6	0	5	0	15	2	4	1	30	3
39	9	0	7	1	17	2	3	2	36	5
40	3	1	10	4	5	5	0	3	18	13
41	2	4	3	7	0	2	1	7	6	20
42	2	8	0	9	0	4	0	8	2	29
43	0	17	0	12	0	2	0	17	0	48
44	0	14	0	23	0	2	0	20	0	59
45	0	20	0	8	0	0	0	10	0	38
46	0	5	0	1	0	1	0	6	0	13
47	0	1	0	0	0	0	0	1	0	2
48	0	0	0	0	0	0	0	0	0	0
49	0	1	0	0	0	0	0	0	0	1
TOTAL	25	74	34	65	70	29	20	79	149	247
MATURITIES										
1	0	0	0	0	2	1	0	0	2	1
2	24	4	33	0	68	2	20	1	145	7
3	0	62	0	64	0	26	0	75	0	227
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0
7	1	8	1	1	0	0	0	3	2	12
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0

Table 8 (cont'd) S. alutus

AREA	MITCHELL'S GULLY						TOTAL	
DATE	310884		020984		030984			
DEPTH	236		252		355			
SET	007		011		020			
	M	F	M	F	M	F	M	F
LENGTH (CM)								
20	0	0	1	0	0	0	1	0
21	0	0	0	0	0	0	0	0
22	0	0	1	0	0	0	1	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	1	0	1	0	0	1	2	1
27	0	0	4	4	0	0	4	4
28	0	0	6	5	0	1	6	6
29	0	0	5	3	0	1	5	4
30	0	1	7	11	0	0	7	12
31	0	0	2	12	0	0	2	12
32	1	0	2	0	0	0	3	0
33	0	0	3	0	0	0	3	0
34	1	1	1	1	0	0	2	2
35	2	2	2	2	1	0	5	4
36	1	0	1	0	2	0	4	0
37	0	1	0	1	6	0	6	2
38	2	0	0	0	5	3	7	3
39	3	0	4	1	11	15	18	16
40	5	1	4	1	6	16	15	18
41	7	1	2	2	1	15	10	18
42	7	2	1	1	0	11	8	14
43	5	6	4	2	0	4	9	12
44	3	7	0	2	0	0	3	9
45	2	21	0	0	0	0	2	21
46	0	11	0	0	0	0	0	11
47	1	1	0	0	0	0	1	1
48	0	3	0	0	0	0	0	3
49	0	0	0	0	0	0	0	0
TOTAL	41	58	51	48	32	67	124	173
MATURITIES								
1	2	0	28	0	0	1	30	1
2	38	2	23	41	32	2	93	45
3	0	54	0	7	0	59	0	120
4	1	0	0	0	0	0	1	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	2	0	0	0	4	0	6
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0

Table 8 (cont'd) S. alutus

AREA	TRIANGLE IS.				TOTAL		GRAND TOTAL	
DATE	060984		080984					
DEPTH	196		272					
SET	036		039					
	M	F	M	F	M	F	M	F
LENGTH (CM)								
20	0	0	0	0	0	0	1	0
21	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	1	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	2	1
27	0	0	0	0	0	0	4	4
28	0	0	0	0	0	0	6	6
29	0	0	0	0	0	0	5	4
30	0	0	0	0	0	0	8	12
31	0	0	2	0	2	0	4	12
32	0	0	0	0	0	0	4	1
33	0	0	0	3	0	3	7	5
34	0	0	1	1	1	1	7	5
35	0	0	1	1	1	1	17	12
36	0	0	3	0	3	0	22	2
37	0	0	6	0	6	0	33	4
38	1	0	11	0	12	0	49	6
39	3	0	12	1	15	1	69	22
40	2	0	8	2	10	2	43	33
41	2	1	6	5	8	6	24	44
42	3	8	4	7	7	15	17	58
43	1	10	0	10	1	20	10	80
44	1	7	0	9	1	16	4	84
45	0	17	0	3	0	20	2	79
46	0	22	0	2	0	24	0	48
47	0	10	0	1	0	11	1	14
48	0	8	0	0	0	8	0	11
49	0	3	0	0	0	3	0	4
TOTAL	13	86	54	45	67	131	340	551
MATURITIES								
1	0	0	3	0	3	0	35	2
2	13	0	49	2	62	2	300	54
3	0	82	0	43	0	125	0	472
4	0	0	0	0	0	0	1	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	4	2	0	2	4	4	22
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0

Table 8 (cont'd) S. reedi

			TOTAL		GRAND TOTAL	
AREA	OUTSIDE GOOSE IS. GULLY					
DATE	290884					
DEPTH	254					
SET	006					
	M	F	M	F	M	F
LENGTH (CM)						
40	4	0	4	0	4	0
41	9	0	9	0	9	0
42	30	0	30	0	30	0
43	24	2	24	2	24	2
44	16	0	16	0	16	0
45	8	1	8	1	8	1
46	1	1	1	1	1	1
47	2	1	2	1	2	1
48	1	0	1	0	1	0
TOTAL	95	5	95	5	95	5
MATURITIES						
1	0	0	0	0	0	0
2	95	0	95	0	95	0
3	0	1	0	1	0	1
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	4	0	4	0	4
8	0	0	0	0	0	0
9	0	0	0	0	0	0

Table 11. Description of rockfish maturity stages.

Maturity code			Gonad condition
	1	Immature	(translucent, small)
Females:	2	Maturing	(small, yellow eggs; translucent or opaque)
	3	Mature	(large, yellow eggs; opaque)
	4	Fertilized	(large, orange-yellow eggs; translucent)
	5	Embryos or larvae	(includes eyed eggs)
	6	Spent	(large, flaccid, red ovaries. A few larvae may be present)
	7	Resting	(moderate size, firm, red-grey ovaries)
	1	Immature	(translucent, stringlike)
Males:	2	Maturing-small	(swelling, brown-white, small)
	3	Maturing-large	(swelling, brown-white, large)
	4	Mature	(large, white; easily broken)
	5	Ripe	(running sperm)
	6	Spent	(flaccid, red)
	7	Resting	(ribbon-like; small, brown)

Table 12. Total trawlable area (naut. mi^2) for Goose Is. Gully and Mitchell's Gully.

Depth interval (m)	
	Mitchell's Gully
182-218	180
219-254	103
255-291	61
292-327	72
328-364	55
	Goose Is. Gully
146-181	432
182-218	351
219-254	190
255-291	174

Table 13. Pacific ocean perch biomass estimates (mt) for the R/V G.B. REED and the M/V EASTWARD HO, Aug.-Sept., 1984.

Depth interval (m)	Vessel	Total biomass (t)	Percent by weight (≥31 cm)	Marketable biomass (t)
		Goose Is. Gully		
146-181	G.B. REED[a]	4057 ± 70%		2190
	G.B. REED[b]	1117 ± 70%	54%	603
	EASTWARD HO[c]	889 ± 430%		480
182-218	GBR[a]	13606 ± 61%		12653
	GBR[b]	3742 ± 61%	93%	3480
	EHO[c]	9805 ± 55%		9118
219-254	GBR[a]	5488 ± 31%		4609
	GBR[b]	1509 ± 31%	84%	1267
	EHO[c]	2742 ± 73%		2303
255-291	GBR[a]	5710 ± 96%		5139
	GBR[b]	1570 ± 96%	90%	1413
	EHO[c]	4778 ± 36%		4300
		Mitchell's Gully		
182-218	GBR[a]	6081 ±128%		2432
	GBR[b]	1672 ± 128%	40%	668
	EHO[c]	842		336
219-254	GBR[a]	3430 ± 73%		2092
	GBR[b]	943 ± 73%	61%	575
	EHO[c]	1840 ± 82%		1122
255-291	GBR[a]	1397 ± 48%		1285
	GBR[b]	384 ± 48%	92%	354
	EHO[c]	297 ± 116%		273
292-327	GBR[a]	2519 ± 116%		2493
	GBR[b]	693 ± 116%	99%	686
	EHO[c]	524 ± 130%		518
328-364	GBR[a]	831 ± 55%		831
	GBR[b]	229 ± 55%	79%	229
	EHO[c]	152 ± 152%		152

[a]Based on K_a value of .026727 (wingspread).

[b]Based on K_a value of .0972166 (doorspread).

[c]Based on K_a value of .0568804 (doorspread).

Table 14. Differences between replicate hauls made by G.B. REED at standard stations in Queen Charlotte Sound, 1984.

Station	Haul	Gully[a]	CPUE (kg/hr)	Absolute difference	Difference as % of mean
1	4	G	398	2182	146.5
	34		2580		
2	5	G	824	334	50.8
	35		490		
3	7	G	182	76	34.5
	44		258		
4	8	G	524	180	29.3
	45		704		
5	9	G	896	640	111.1
	46		256		
6	11	G	1494	1038	106.5
	48		456		
7	13	G	146	176	75.2
	50		322		
8	14	G	956	3522	129.6
	49		4478		
9	19	G	1058	610	81.0
	41		448		
10	20	G	1054	36	3.4
	40		1090		
11	21	G	158	1318	161.3
	42		1476		
12	22	G	164	1846	169.8
	43		2010		
13	24	M	164	336	101.2
	58		500		
14	25	M	458	36	7.6
	53		494		
15	26	M	686	1408	101.3
	54		2094		
16	27	M	862	696	57.5
	55		1558		
17	28	M	766	400	70.7
	60		366		
18	29	M	426	110	22.9
	59		536		
19	30	M	810	302	45.9
	57		508		
20	31	M	568	6	1.1
	61		574		
21	33	M	1598	854	72.9
	56		744		

Total N=21 $\bar{X}$=75.3% S.E.=11.1%

Goose Is. Gully N=12 $\bar{X}$=91.6% S.E.=15.8%

Mitchell's Gully N=9 $\bar{X}$=53.4% S.E.=12.4%

[a]G = Goose Is. Gully.
M = Mitchell's Gully.

Table 15. Comparison of Pacific ocean perch catch rates (kg/hr) for the G.B. REED and the EASTWARD HO.

Haul no.					
GBR	EHO	$CPUE_{GBR}$	$\overline{CPUE}_{GBR}$	$CPUE_{EHO}$	Catch ratio[a]
4	25	398	1489	2384	.6245
34		2580			
5	24	824	657	1442	.4556
35		490			
7	27	182	220	1471	.1495
44		258			
8	28	524	614	591	1.0389
45		704			
9	29	896	576	370	1.5567
46		256			
12	26	20	-	Tr	-
47		12			
11	32	1494	975	482	2.0228
48		456			
13	30	146	234	235	.9957
50		322			
14	31	956	2717	1250	2.1736
49		4478			
19	33	1058	753	768	.9804
41		448			
20	34	1054	1072	1732	.6189
40		1090			
21	36	158	817	1918	.4259
42		1476			
22	35	164	1087	1353	.8033
43		2010			
23	23	1828	-	2421	.7550
24	19	164	332	24	13.833
58		500			
25	20	458	476	284	1.6760
53		494			
26	21	686	1390	582	2.3883
54		2094			

Table 15 (cont'd)

Haul no. GBR	Haul no. EHO	$CPUE_{GBR}$	$\overline{CPUE}_{GBR}$	$CPUE_{EHO}$	Catch ratio[a]
27	17	862	1210	1688	.7168
55		1558			
28	14	766	566	132	4.2878
60		366			
29	18	426	481	246	1.9552
59		536			
30	15	810	659	471	1.3991
57		508			
31	12	568	571	321	1.7788
61		574			
33	13	1598	1171	266	4.4022
56		744			
					Mean 2.0471[b]
					Std. Err. 0.6093
				(without EHO Haul No. 19)	Mean 1.4859[b]
					Std. Err. 0.2489

[a] $\frac{\overline{CPUE}_{GBR}}{CPUE_{EHO}}$

[b] catch ratio weighted by: $\frac{\overline{CPUE}_{GBR} + CPUE_{EHO}}{\sum_{i=1}^{N} (\overline{CPUE}_{GBR} + CPUE_{EHO})}$

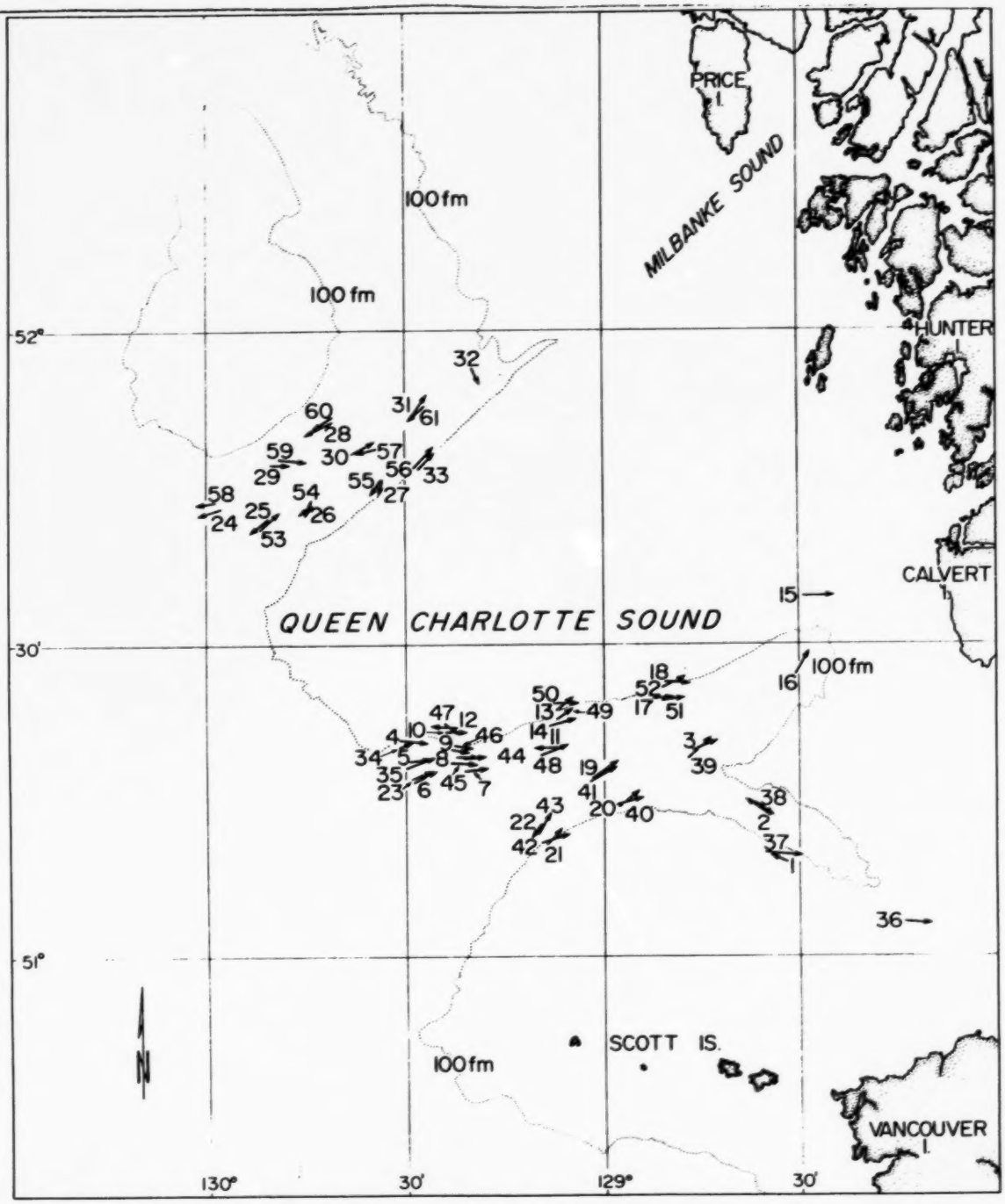


Fig. 1. Haul locations for the R/V G.B. REED, Aug.- Sept., 1984.

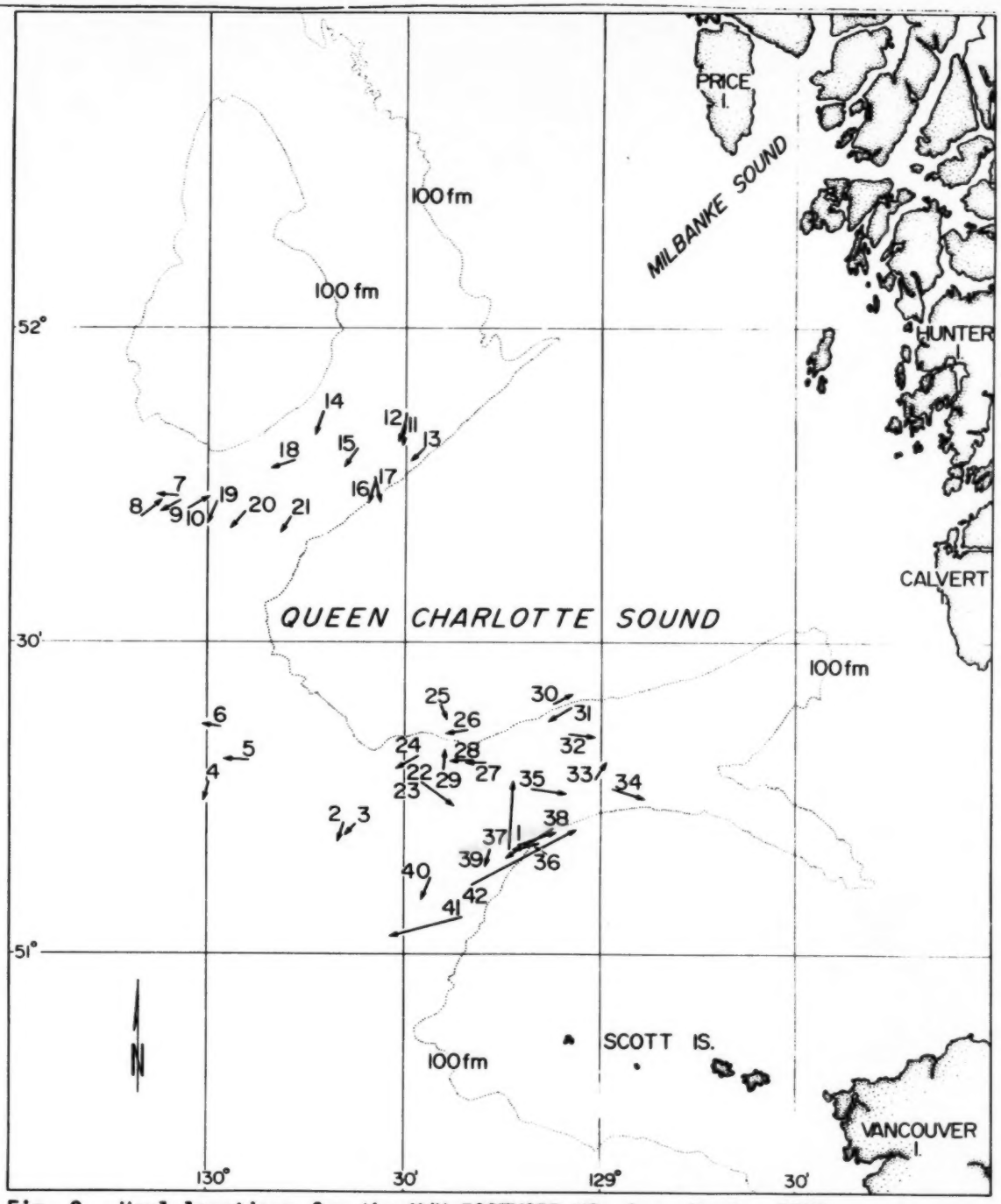


Fig. 2. Haul locations for the M/V EASTWARD HO, Aug.-Sept., 1984.

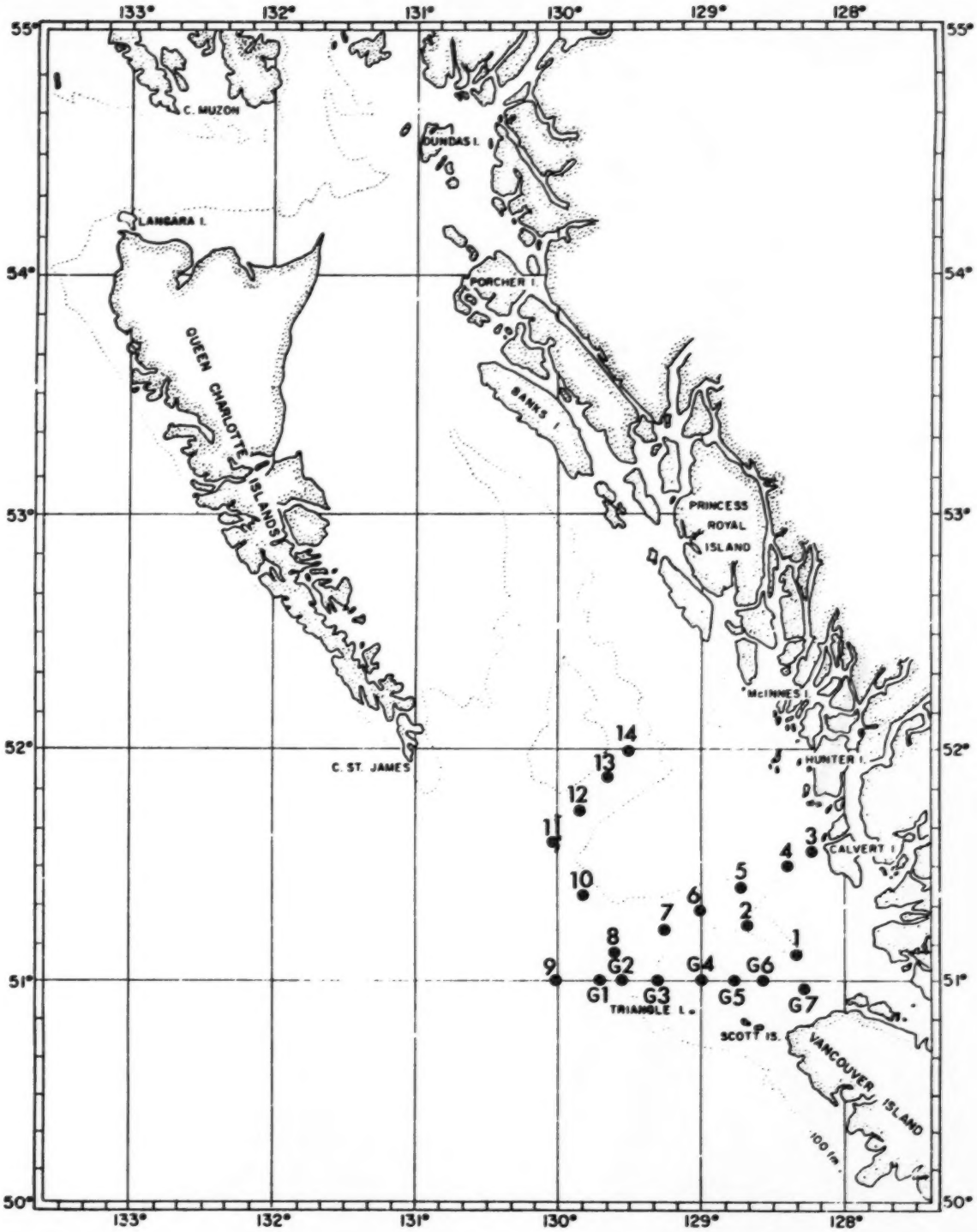


Fig. 3. Oceanographic stations occupied by R/V G.B. REED, Aug.-Sept., 1984.

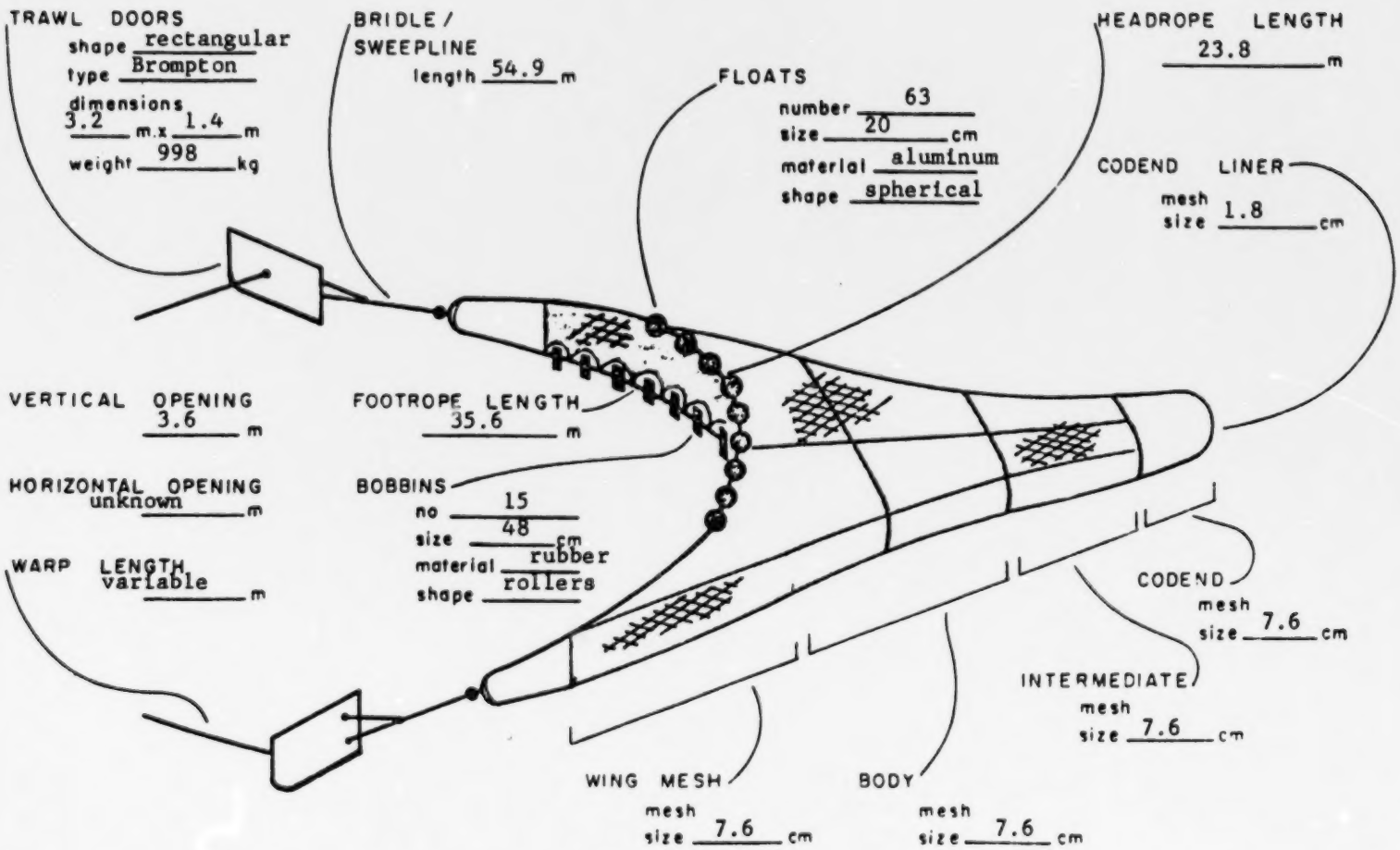
Appendix tables (pages 49 - 106) appear in fiche only.

Appendix Figure 1.

NET DIMENSIONS AND CHARACTERISTICS FOR BOTTOM TRAWL

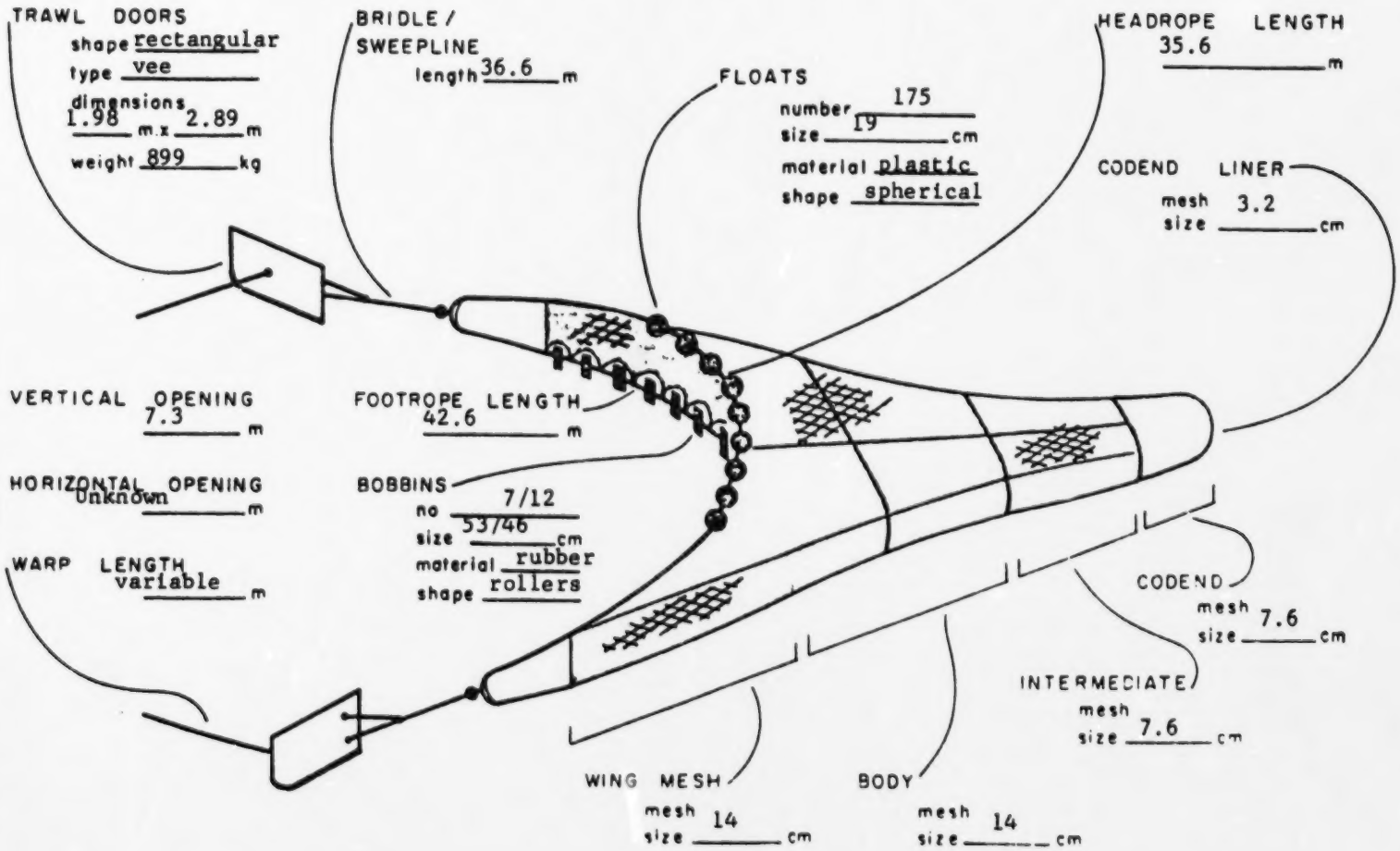
VESSEL R/V G.B. REED NET Granton

OBSERVATION PERIOD Aug. 14-18; Aug. 26-Sept. 11, 1985.



Appendix Figure 2.

NET DIMENSIONS AND CHARACTERISTICS FOR BOTTOM TRAWL

VESSEL EASTWARD HO NET rockhopper box trawl

OBSERVATION PERIOD Aug. 25-Sept. 9, 1985.